Name:_____ Date:_____

A2&T: Simplifying Rational Expressions

Do Now

Factor completely:

a] $x^3 + 4x^2 - 21x$

b] $a^5 - a$

C] Solve: $9x^{-\frac{2}{3}} = 4$

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A rational number is the quotient of two integers. A **rational expression** is the quotient of two polynomials. Each of the following fractions is a rational expression:

$$\frac{3}{4} \qquad \frac{ab}{7} \qquad \frac{x+5}{2x} \qquad \frac{a^2-1}{4ab} \qquad \frac{y-2}{y^2-5y+6}$$

Division by 0 is not defined. Therefore, each of these rational expressions has no meaning when the denominator is zero. For instance:

- $\frac{x+5}{2x}$ has no meaning when $x = 0$.
- $\frac{a^2-1}{4ab}$ has no meaning when $a = 0$ or when $b = 0$.
- $\frac{y-2}{y^2-5y+6} = \frac{y-2}{(y-2)(y-3)}$ has no meaning when $y = 2$ or when $y = 3$.

## Developing Skills

In 3–10, list the values of the variables for which the rational expression is undefined.

**3.** $\frac{5a^2}{3a}$ **4.** $\frac{-2d}{6c}$ **5.** $\frac{a+2}{ab}$ **6.** $\frac{x-5}{x+5}$

**7.** $\frac{2a}{2a-7}$ **8.** $\frac{b+3}{b^2+b-6}$ **9.** $\frac{4c}{2c^2-2c}$ **10.** $\frac{5}{x^3-5x^2-6x}$

Simplify:

In 11–30, write each rational expression in simplest form and list the values of the variables for which the fraction is undefined.

**11.** $\frac{6}{10}$ **12.** $\frac{5a^2b}{10a}$ **13.** $\frac{12xy^2}{3x^2y}$ **14.** $\frac{14b^4}{21b^3}$

**15.** $\frac{9cd^2}{12c^4d^2}$ **16.** $\frac{8a+16}{12a}$ **17.** $\frac{9y^2+3y}{6y^2}$ **18.** $\frac{8ab-4b^2}{6ab}$

**19.** $\frac{10d}{15d-20d^2}$ **20.** $\frac{8c^2}{8c^2+16c}$ **21.** $\frac{3xy}{9xy+6x^2y^3}$ **22.** $\frac{2a+10}{3a+15}$

**23.** $\frac{4a^2-16}{4a+8}$ **24.** $\frac{x^2-7x+12}{x^2+2x-15}$ **25.** $\frac{5y^2-20}{y^2+4y+4}$ **26.** $\frac{-7+7a}{21a^2-21}$